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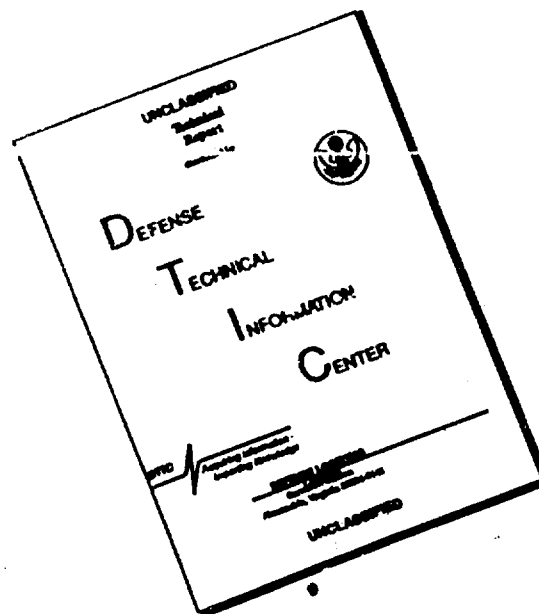
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Microbiology in the USSR Academy of Science

by B. L. Isachenko

Fig. 1

The world of lower organisms, from the time of the discovery of the microscope, interested scientists and drew their attention to research, but to proceed further with the study was not easy. The microscope was not widely distributed in university laboratories.

The first microscopic laboratory was organized in Petersburg in 1891. At the Academy of Science, a microscopic laboratory was established in 1930.

General microbiology is connected on one side to physiology, chemistry and its branches, and on another - with biological sciences, chiefly botany.

A deficiency in the system of the Academy microbiological laboratories is that the main achievements of Russian scientists in the field of microbiology were done outside the walls of the Academy of Science. A widespread glance at microbiology's implications of a medical character resulted in the establishment of an academic microbiological laboratory composed of workers in the field of medical microbiology. However, this branch of microbiology could be developed only by creating an isolation laboratory, equipped for experiments, with compartments for experimental animals. Therefore, the experience of combining general microbiology with medical microbiology was unsuccessful at that time (1937) In his time Vinogradski indicated the problems and methods confronting two important branches of microbiology, general and medical.

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In this sketch it appears important to review the microbiological work conducted outside the Academy by its co-members and organized later as the Institute of Microbiology.

Tsenkovsky... worked chiefly in the field of botany, studying lower plant and animal organisms (1856). Studying Rhizoroda, Myxomycetes and Flagellata he concluded there was a close relationship between plant and animal protista. In his later years he studied anthrax and first described *Leuconostoc mesenteroides*.

Vinogradsky, born 1856. (There follows a summary of his work in soil microbiology, which can be read in any encyclopedia)

Omelyansky first worked with Vinogradsky on the process of nitrification. Attention focused on him for the discovery of two microbes stimulating fermentation, one of which produces methane during decomposition, and the other producing hydrogen. A master of words, he did much to popularize knowledge of microorganisms.

Butkevich (1872-1942) was concerned with the physiology and biochemistry of plants and the use of acid by plant organisms. He worked with the expeditionary ship of the Naval Institute in arctic waters and differentiated between the true sea bacteria and those carried from land.

Isachenko (1871) physiology of plants, bacteria of the Arctic sea, and therapeutic muds.

In 1930 the Microbiological Institute of the Academy of Sciences had a small laboratory. Scientists (Krasilnikov and Kydravits) studying yeasts, molds and bacteria, found that contemporary classification needed revision. Attention was given

to the variability and evolution of new forms of microbes. This genetic trend was echoed in the work of Filipov studying changes in microorganisms under the influence of Roentgen rays and radium.

In studying the symbiosis and antagonism of microbes, specific bacteria were found in the soils, capable of killing parasitic fungi, and plant protection from parasitic fungi was developed. (Novogrydsky, Nakhimovsky, Khudyakov)

Studies on virus were begun at the end of 1935. In 1937 studies were made on ecology and physiology of microorganism, their connection with industry and agriculture - for instance, use of microbes in obtaining lactates from plant raw material and the increased yield of such products as vitamins and hormones, thermophilic bacteria capable of growth at high temperatures (60°) for use in industrial processes. Success of the latter work resulted in development of the bacterial preparation "suberbiolase", by Imshensky. In the field of general microbiology Isachenko studied development of aromatic compounds with thermophilic bacteria, showing that the difficult process of cleansing factory waters containing phenol, by chemical means, gives best results using specific microorganisms, thermophilic as well as mesophilic.

Two branches of soil science were developed. (1) the relationship between plants and microbes, the role of hormones in application of fertilizers and as substitute for agricultural preparations; and (2) structural development of soils, in which it was found that the major role is played not by bacteria but by fungi and actinomyces. In oil research aerobacteria (sulphurous bacteria) in the fields of Bakya were described.

Studies in ultravirus were begun at the end of 1935, first in the spread of disease. In 1937 studies were made on ecology and physiology of microorganisms, their connection with industry and agriculture - for instance, use of microbes in obtaining lactates from plant raw material and the increased yield of such products as vitamins and hormones, thermophilic bacteria capable of growth at high temperatures (60°) for use in industrial processes. Success of the latter work resulted in development of the bacterial preparation "suberbiolase", by Imshensky. In the field of general microbiology Isachenko studied development of aromatic compounds with thermophilic bacteria. By this it was shown that the difficult process of cleansing factory waters containing phenol, by chemical means, gives best results using specific microorganisms, thermophilic as well as mesophilic.

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The research of Méycelya, Odintsova and Tysca defined the role of yeasts in the synthesis of vitamin B group and made possible commercial cultivation of vitamins.

Shaposhnikov and Kydravetz founded a classification of bacteria and yeasts on morphological and physiological characteristics.

Viruses obtained in crystalline form were the subject of study, as being the simplest form of life. Attention was also given to the activity of virus albumin and conditions by which insects carry contagious disease - virus diseases of cats, tomato, tobacco mosaic etc.

The work of Krise concerned bacteriophage and therapeutic preparations against dysentery, typhus etc. . Cyshkin studied ecology of nitrous bacteria.

A series of monographs were published: Phytopathogenesis of bacteria, (1935), Actinomycetes and related organisms, (1938), Definition of Actinomycetes, (1941), Structure of Bacteria (1940), Microbiological Processes at High Temperatures (1945), Virus Diseases of Plants (1944); Viruses of plants and insect vectors (1942); Virus Diseases of Plants and Measures in the Fight Against them (1941).

Pride not only of Russia, but of the world, was Ilya Ilich Mechnikov (1845-1916) who after 20 years of work, gave his entire attention to questions of immunity and infection. To him belongs the phagocytic theory of immunity

Nikolai, Fedorovich Gamaliya, born 1859, working largely in medical microbiology. He was one of the first in the country to obtain antirabies vaccine, described lysis of anthrax bacillus.

Zabolot (1866-1929) did experimental research in cholera, syphilis, diphtheria, typhoid fever and exanthematic typhus, malaria etc. and epidemiology

Belonovsky worked with plague, typhoid etc, his name being linked in Russia with the first study of effective typhoid vaccine. A participant in the fight against epidemics of cholera, exanthematic typhus etc. Belonovsky made significant contributions to the theory of immunity.

Trans. fr. Russian
by Fahrney